ANNOTATIONES ZOOLOGICAE JAPONENSES
Volume 51, No. 3—September 1978

Published by the Zoological Society of Japan

Three Harvestmen (Arachnida, Opiliones) from the Bonin Islands

With 2 Text-figures

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ABSTRACT Descriptions of two new opilionids, *Verpulus boninensis* and *Verpulus similis* (Palpatores, Gagrellidae, Zalepteae) from the Bonin Islands are given. *Bandona boninensis* Suzuki (Laniatores, Assamiidae) seems to produce parthenogenetically. The Bonin opilionid fauna shows a close Indo-Malayan affinity.

The present paper deals with two new species and one known species of opilionids from the Bonin Islands, Southern Japan. Including the species dealt with in this report, one assamiid, *Bandona boninensis* Suzuki, one gagrellid, *Hologagrella minatoi* Suzuki, and two zaleptids, *Verpulus boninensis* n. sp. and *Verpulus similis* n. sp., a total of four species are known to occur in the Bonin Islands. All the species which are endemic to the Islands show strong Indo-Malayan affinities. This indicates that all the Bonin opilionids have been derived from the Indo-Malayan region. Accordingly, so far as Opiliones are concerned, the Bonin Islands are regarded zoogeographically as belonging to the Oriental Region.

The holotypes and the specimens used for this study are deposited in the Suzuki collection.

Subord. LANIATORES

Superfam. GONYLEPTOIDEA

Fam. Assamiidae

Subfam. Hypoxestinae

Bandona boninensis Suzuki

Bandona boninensis Suzuki, 1974, J. Sci. Hiroshima Univ., (B–1), **25**: 130–133, f. 1–8.

Specimens newly examined. 21 ♀, 22 pulli, Byobu-dani, Chichi-jima, the Bonin Islands, 12–VI–1977, H. Minato leg., taken from the ground covered by stones and dead leaves; 1 ♀, Mt. Yoake-yama, Chichi-jima, 7–XII–1977, M. Tomokuni leg.

Distribution. Known only from the Bonin Islands.

Twenty-one mature specimens examined were entirely females. No male has ever been found for this species. This hints that the present animal may produce parthenogenetically.

Subord. PALPATORES

Superfam. PHALANGIOIDEA

Fam. Gagrellidae

Subfam. Gagrellinae

Group Zalepteae

Gen. ***Verpulus*** Simon, 1901

Verpulus Simon, 1901, Proc. zool. Soc. London, pars 2: 84. —— Roewer, 1910, Abh. Ver. Hamburg, **19**: 150; 1912, Arch. Naturg., **78A**: 52; Die Weberknechte der Erde, p. 1056; 1955, Senck. biol., **36**: 140.

Noduli formula 0: 3 (variation 1–4): 0: 0; eye tubercle smooth or granulate but not toothed, without a prominent enlarged spine; first and third femora cylindrical and longer than body. (Type-species: *V. spumatus* Simon, 1901.)

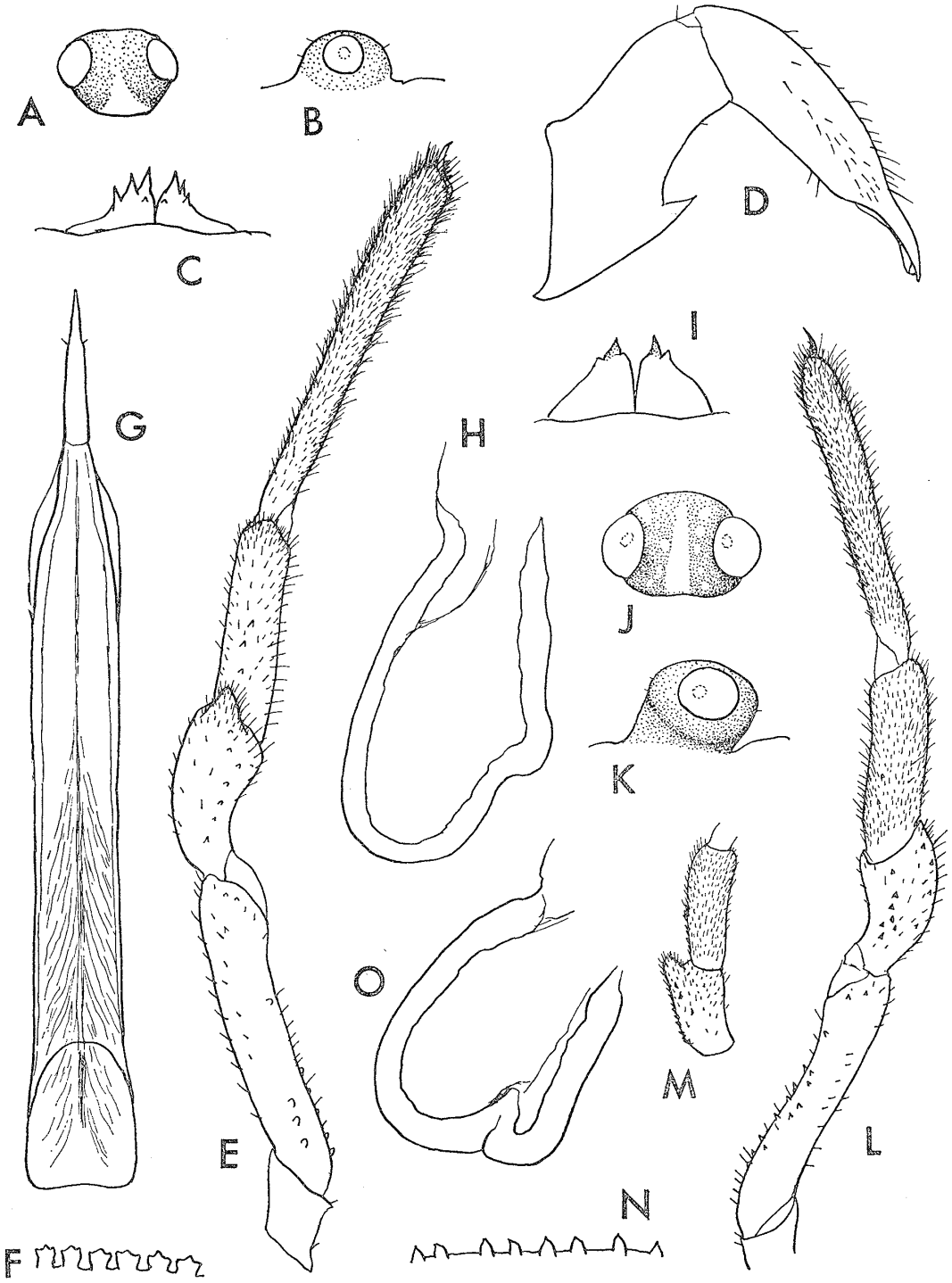
Notes. Three zaleptid genera, *Verpulus* Simon, 1901, *Zaleptanus* Roewer, 1929, and *Metazaleptus* Roewer, 1912, are closely related to each other, differing only in the noduli number on the second femur. It is two in *Verpulus*, three in *Zaleptanus* and four in *Metazaleptus*. However, as to the noduli number in the Zalepteae, a great variation was reported by Suzuki (1977) who studied a number of the Philippines specimens. The same is also true for the Bonin zaleptids (see Table 1). If we emphasize the noduli number as a generic character, it is impossible to make generic assignment of the Bonin zaleptids. Due to the occurrence of two noduli in the majority of specimens, it seems best to place them at present in the genus *Verpulus*. Their generic status must be established by future studies.

KEY TO THE SPECIES OF THE *Verpulus* FROM THE BONIN ISLANDS

1. Dorsum of body clothed with rounded tuberculations; eye tubercle lower than usual; marginal humps of 1–4 coxae three-pointed ..... *V. boninensis* n. sp.

Fig. 1. —— A–H. *Verpulus boninensis* n. sp. —— A, Dorsal and B, lateral view of eye tubercle, male; C, dorsal view of supracheliceral lamellae, male; D, male left chelicera, medial; E, male left palpus, medial; F, ventral view of marginal humps on the anterior side of first coxa, male; G, ventral view of penis; H, seminal receptacle. —— I–O. *Verpulus similis* n. sp., female holotype. —— I, Dorsal view of supracheliceral lamellae; J, dorsal and K, lateral view of eye tubercle; L, lateral view of left palpus; M, dorsal view of patella and tibia of palups; N, ventral view of marginal humps on the anterior side of first coxa; O, seminal receptacle.

(Magnifications: A, B ×27; C, F, I, N ×60; D, E ×47; G ×66; H, O ×600; J, K, L ×30; M ×22)



— Dorsum of body with microscopic, pointed tubercles; eye tubercle normal in height; marginal humps of 1–4 coxae simple, not three-pointed .... *V. similis* n. sp.

Verpulus boninensis n. sp.

(Fig. 1 A–H; Fig. 2 A–B)

Type-series. Male holotype and 2 male, 5 female, and 2 immature paratypes, Mt. Chibusa-yama, Haha-jima, the Bonin Islands, 22–VI–1977, H. Minato leg.

Description. Measurements (in mm). ♂ (in parentheses ♀). Total body length 2.7–3.0 (3.0–4.4), width of cephalothorax 2.1 (2.6), width of abdomen 1.8–2.1 (2.9–3.2). Length of femora 6.7 (8.9): 11.6 (13.0): 6.5 (7.2): 8.6 (9.7). Total length of legs 40.6 (46.8): 62.0 (70.1): 40.4 (35.6): 51.1 (49.0).

Male:— Body from above long oval with abdomen pointed posteriorly; in some specimens, free tergites turned under and the abdomen broadly rounded behind. Carapace, dorsal scutum and median plates of free tergites uniformly clothed with rounded tuberculations. Eye tubercle lower than usual, constricted basally, canaliculate above, unarmed, smooth entirely. Venter: surface of coxae smooth except for few short bristles; a row of small tubercles present anteriorly on all coxae and posteriorly on first and fourth coxae; tubercles three-pointed. Genital operculum with scattered granules, smooth distally, with a row of tubercles along lateral margins. Free sternites tuberculate on the median region.

Chelicera normal in structure, unarmed. Supracheliceral lamellae armed with sharp-pointed teeth at tip, as in Fig. 1 C.

Palpus relatively long, normal in structure; patella swollen distally, medio-apically produced into a short lobe; segments only poorly toothed as in Fig. 1 E, tarsus lacking a row of teeth ventrally.

Legs slender and long, first and third femora more than twice as long as the body. Trochanters armed laterally, and femora with very fine teeth throughout; patellae and tibiae with but few teeth. First, third and fourth femora without noduli, second with two or three noduli (rarely one or four) (see variations).

Penis as shown in Fig. 1 G; shaft with sides nearly parallel, narrowed distally; ventral side of the opening of shaft deeply indented. Alated; alate part small.

Coloration. Dorsum and venter pale yellow to rusty, dorsum somewhat darker than venter. All tuberculations of the dorsum rusty brown. Eye tubercle pale, with broad dark brown to black eye rings. Chelicera and palpus pale yellow; femur, patella and tibia with brown patches. All trochanters and caput of femora of legs deep blackish brown, contrasting to the light yellow coxae; remaining leg-segments dark brown, distal part of tibiae paler.

Female:— In general similar in appearance to the male but with larger body and the abdomen broadly rounded posteriorly. Central figure of dark brown is very obscurely developed on the dorsal scutum. Seminal receptacle as in Fig. 1 H.

Table 1
Noduli number on the second femora in *Verpulus boninensis*.

Sex	Noduli nos.	Sex	Noduli nos.
♀	2	♂	2
♀	2R 3L	♂	1R 2L
♀	3R 2L	♂	4R 2L
♀	3	pull	2
♀	— 4L	pull	— 4L

If noduli number was symmetrical, only one number was given.
—: Not examined.

Remarks. The present species more or less resembles *V. magnus* Roewer from Thailand, differing in having much smaller body and the first cheliceral segment not provided with teeth on the dorsal surface.

Variations. The specimens examined contained three males, five females and two immatures. The noduli number on the second femora was as shown in Table 1. The noduli number varied within the range from one to four, and each showed the following frequency: 1 (5%), 2 (58%), 3 (26%) and 4 (11%).

Verpulus similis n. sp.

(Fig. 2 I–O; Fig. 2 C)

Type-series. Female holotype, Mt. Chibusa-yama, Haha-jima, the Bonin Islands, 22–VI–1977, H. Minato leg.

Description. Measurements (in mm). ♀. Total body length 4.4; cephalothorax 1.1 long, 2.9 wide; abdomen 2.8 wide. Length of femora 6.4: 11.6: 6.4: 8.6. Total length of legs 32.5: 62.5: 33.0: 44.9.

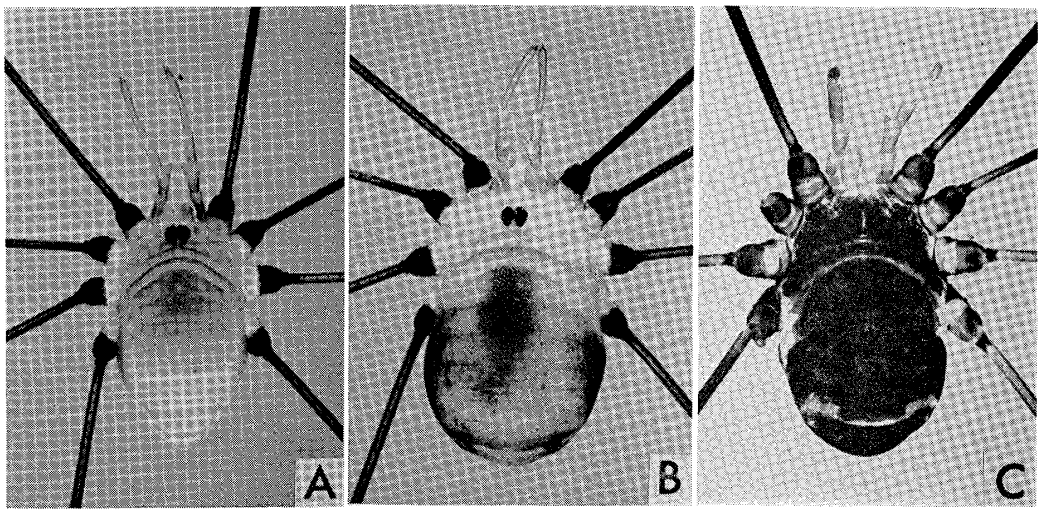


Fig. 2. —— A–B. *Verpulus boninensis* n. sp.; dorsal view, A, male and B, female. —— C. *Verpulus similis* n. sp.; dorsal view of female holotype. (Magnifications: All ×7)

Female:— Body typical ellipsoid in dorsal view. Surface of dorsum with dense covering of very small pointed whitish granules, only median area before the eye tubercle smooth. Eye tubercle normal in structure, canaliculate above, completely unarmed. Venter: surface of 1–4 coxae smooth, with only short scattered hairs; a row of small pointed teeth present anteriorly on all coxae, and posteriorly on first and fourth coxae. Genital operculum with short hairs and a row of marginal teeth along lateral margins. Free sternites smooth, clothed with only short hairs.

Chelicera normal in structure. Supracheliceral lamellae as in Fig. 1 I.

Palpus as illustrated in Fig. 1 L; patella with a short distomedial apophysis.

Legs slim and long, armaments similar to those in the foregoing species. First, third and fourth femora without noduli, second with three.

Coloration. Dorsal surface of body almost dark brown; minute granulations white. Front area before the eye tubercle pale, on which present two short streaks of brown. Eye tubercle dark brown, with a silvery white median groove, and a series of minute whitish yellow dots on the carinae. Central figure is hardly developed, one median pair of pale dots segmentally on each tergal area; one large pale white patch on the lateral sides of abdomen, also, a similar patch on the hind corner of the dorsal scutum. 1–4 coxae dark brown, paler distally; free sternites pale, with a dark brown band segmentally. Chelicera and palpus whitish yellow; femur, patella and tibia partly brown. Legs: trochanters dark brown, lighter dorsally than ventrally; remaining leg-segments brown, caput of femora dark brown, femora and tibiae with broad distal band of greyish white.

Seminal receptacle as in Fig. 1 O.

Male:— Unknown.

Remarks. As to the noduli number, only right second leg was examined. It showed three noduli on the femur. So, if we rely upon this character, this specimen must belong to *Zaleptanus*. However, as mentioned in the account of the previous species, the noduli number of the *Verpulus* is variable within the wide range. Therefore, here also, it is wise to place it in *Verpulus*.

This species is most closely related to the foregoing species, from which it is separated by the following respects.

1) The tuberculations on the dorsum of body are minute tooth-shaped (that of *V. boninensis* are rough, rounded).

2) The marginal humps of 1–4 coxae are not three-pointed but of simple shape.

3) The eye tubercle, differing from that of *V. boninensis*, is normal in height.

ACKNOWLEDGMENTS

I have to thank Mr. H. Minato and Mr. M. Tomokuni for their contributions to the material.

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